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Does Relaxation Education in Anxious Primigravid Iranian Women Influence Adverse Pregnancy Outcomes?
A Randomized Controlled Trial

Farideh Bastani, PhD; Alireza Hidarnia, PhD; Kristen S. Montgomery, PhD; Maria E. Aguilar-Vafaei, PhD; Anoshirvan Kazemnejad, PhD

Context: Maternal anxiety and stress are found to be predictors of adverse pregnancy outcomes, including low birth weight and prematurity. **Objective:** The aim of the study was to determine whether relaxation education in anxious pregnant Iranian women in their first pregnancy affects selected pregnancy outcomes, including birth weight, preterm birth, and surgical delivery rate. **Subjects:** A total of 110 obstetrically and medically low-risk primigravid women in Iran with a high anxiety level demonstrated by Spielberger's State-Trait Anxiety Inventory were randomly assigned into experimental and control groups. **Method:** In this randomized controlled trial, the experimental group received routine prenatal care along with 7-week applied relaxation training sessions, while the control group received only routine prenatal care. Anxiety and perceived stress were measured by preeducational and posteducational intervention. Data related to pregnancy outcomes include birth weight, gestational age at birth, and type of delivery. **Results:** Significant reductions in low birth weight, cesarean section, and/or instrumental extraction were found in the experimental group compared with the control group. No significant differences were found in the rate of preterm birth. **Conclusion:** The findings suggest beneficial effects of nurse-led relaxation education sessions during the prenatal period. This intervention could serve as a resource for improving pregnancy outcomes in women with high anxiety. **Key words:** *anxiety*, *pregnancy outcomes*, *relaxation*

Anxiety is one of the most common mental health problems in women. Women (30.5% lifetime prevalence) are more likely to have anxiety than are men (19.2% lifetime prevalence).[1] In fact, anxiety and depression are common complaints in women, with a prevalence of 30% during pregnancy and the puerperium.[2] Anxiety is a significant emotional health problem that is reported by approximately 20% of persons seeking primary healthcare.[3] Anxiety disorders cost the US healthcare system a staggering $42.3 billion annually.[4] Anxiety is a dimension of stress[5] that occurs in response to internal or external stimuli and can result in physical, emotional, cognitive, and/or behavioral symptoms.[6] In this regard, relaxation techniques are seen as a therapy that is used to decrease anxiety or nervousness in individuals.[7]

From the Departments of Health Education (Drs Bastani and Hidarnia), Psychology (Dr Aguilar-Vafaei), and Biostatistics (Dr Kazemnejad), Tarbiat Modares University, and the Faculty of Nursing and Midwifery, Iran University of Medical Sciences (Dr Bastani), Tehran, Iran; and the School of Nursing, University of South Carolina (Dr Montgomery).

Corresponding author: Farideh Bastani, PhD, Faculty of Nursing and Midwifery, Iran University of Medical Sciences, Rashid-Yasemi St, Vali-Asr Ave, Tehran, Iran (e-mail: faridehbastani@yahoo.com).

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This study concerned the effect of reducing anxiety by relaxation education on the 3 adverse pregnancy outcomes (as 3 major dependent variables) of (*a*) low birth weight (LBW), (*b*) preterm birth, and (*c*) nonvaginal delivery (surgical or cesarean section and instrumental deliveries, including forceps and vacuum extraction) in the experimental and control groups among anxious pregnant women. Several studies suggest that stress and anxiety have profound effects on pregnancy and labor.[8–11] Maternal psychological stress and distress are found to be predictors of adverse pregnancy outcomes, including LBW and prematurity.[2,8,11]

It is well noted in the literature that women with anxiety disorders during pregnancy are at increased risk for intense postnatal depressive symptoms[12] and the majority of these women were found to be undiagnosed and untreated.[13] However, a gap in knowledge exists regarding the effects of a randomized controlled trial of an educational intervention to reduce anxiety and adverse pregnancy outcomes. In this investigation, the findings related to the first part of the study showed that applied relaxation education sessions significantly reduced the level of anxiety and perceived stress in nulliparous pregnant Iranian women who received the intervention (published previously).[14]

In pregnancy, during exposure to stress, various hormones, including corticotropin-releasing hormone, adrenocorticotropin-releasing hormone, cortisol, noradrenalin, and β-endorphin, are released in large quantities in the blood.[10] Increased β-endorphin levels have been associated with decreased uteroplacental blood flow, resulting in fetal hypoxia.[11] Maternal stress and the resultant release of catecholamine can cause uterine vasoconstriction, which can lead to a spectrum of fetal injury, ranging from spontaneous to varying degrees of cerebral damage.[15] Maternal psychological stress has been found to be predictive of LBW and prematurity,[8] which are a major cause of morbidity and mortality in newborns.[16,17] Although some of the studies are conducted on small samples, they reveal the importance of the role of maternal stress and distress during pregnancy. Research on animals indicates that stress during pregnancy has disruptive effects on behavioral and neuromotor development and the stress response of the offspring, and these effects are maintained into adulthood.[18,19]

In fact, studies of the relationship between maternal stress/anxiety and adverse pregnancy outcomes, including LBW and preterm, have been consistent for several decades.[20] In this regard, prenatal psychosocial predictors of infant birth weight and length of gestation were investigated in a prospective study of 320 pregnant Iranian women. Hypotheses specifying that personal resources (self-esteem and birth self-efficacy), prenatal stress (state/trait anxiety), and sociocultural factors (income, education, and race) would have different effects on birth outcomes that were tested using structural equation modeling. Results confirmed that women with stronger resources had higher birth weight babies ($\beta = .20$), whereas those reporting more stress had shorter gestation periods ($\beta = -.21$). Resources were also associated with lower stress ($\beta = -.55$), having higher income and education, and giving birth for the first time.[21]

Birth weight is a popular topic, because it is precisely recorded, is a major determinant of infant survival, and is associated with infant mortality and health outcomes later in life. Low birth weight (<2500 g) is a predisposing factor for metabolic abnormalities[22] and neurodevelopmental disorders.[23] Low birth weight infants (1500–2499 g) are 5 times more likely to die in the first year of their life than normal-weight (≥2500 g) infants.[24]

Preterm delivery that mostly leads to prematurity of newborns can also be a significant problem to the family and society. In other words, preterm delivery may result in the birth of an infant who is ill equipped for extrauterine life and needs special care for her or his growth and development. It can also impose substantial physical, emotional, and financial burdens on the child and the family.[25] Despite years of research, both preterm birth and LBW continue to increase.[26] Two Western studies have reported as 9.6%[27] and 10%[28] the rate of preterm labor that mostly lead to preterm birth.

In this study, the variables of surgical (cesarean section) and instrumental delivery (forceps and vacuum extraction), as pregnancy outcomes, were assessed in the experimental and control group. Although pregnancy is usually a time of joy and anticipation, many women experience some degree of anxiety and worry about social, financial, occupational, and relationship issues that can often add to their stress levels, which increase the possibility of pregnancy complications.[29] It is known that one proximal cause of obstetric complications is increased hormone levels in the uterus. It seems likely therefore that anxiety, a form of arousal known to influence hormone levels, may be implicated as a distal determinant of obstetric complications.[30] In fact, severe fear of childbirth complicates 6% to 10% of parturients. Very often, fear of childbirth leads to request for an elective cesarean section. Fear of childbirth is not an isolated problem but associated with the woman's personal characteristics, mainly general anxiety and low self-esteem, which may lead to surgical delivery.[31]

Some studies[32,33] suggest that there is increased morbidity associated with surgical and instrumental deliveries versus normal vaginal delivery. In other words, nonvaginal deliveries, including instrumental extraction[34,35] and cesarean section,[36,37] are associated with a greater incidence of complications such as fetal injury. Cesarean section rates are rising dramatically. It has been estimated that they have increased from 10% to 22% of all births over 15 years in the United Kingdom. On the basis of a Swedish study which has suggested that fear of childbirth or anxiety during pregnancy may increase the risk of emergency cesarean section, a prospective study in the United Kingdom on 443 pregnant women found that emergency cesarean section was associated with previous cesarean section, parity, age, and a score reflecting medical risk, but *not* fear of childbirth or anxiety measures.[38]

However, a gap in knowledge exists regarding the effects of a randomized controlled trial of an educational intervention to reduce anxiety and adverse pregnancy outcomes. To our knowledge, no similar research has been conducted. The hypothesis tested was that anxious pregnant women who receive nurse-led relaxation training during the second trimester would have a lower rate of preterm birth, LBW, and surgical/instrumental delivery. In this investigation, the findings related to the first part of the study showed that applied relaxation education sessions significantly reduced the level of stress and anxiety in pregnant women who received the intervention of applied relaxation education.[14]

APPLIED RELAXATION

The intervention provided to the experimental group was based on Ost's description of applied relaxation,[39] which includes progressive muscle relaxation and breathing. Applied relaxation is as effective as cognitive therapy for anxiety disorders.[40] A prospective study of 118 Iranian firemen found that applied relaxation significantly reduced both state and trait anxiety in the participants.[41] Participants in the experimental intervention were advised to practice the applied relaxation regularly and kept daily home relaxation practice records during the study.

The first session of the training was an introductory group discussion of anxiety- and stress-related issues in pregnancy, as well as a rational and general description of the purpose of applied relaxation. The second session related to teaching the subjects to relax with the help of a shortened version of progressive relaxation (tense for 5 seconds and relax for 10 seconds) in the large muscles of the hands, arms, face, shoulders, back, chest, stomach, lungs, hips, legs, and feet.

The third session included "release-only" relaxation; this exercise neutralizes the tensing of the muscle groups in order to reduce the time it takes the participant to become relaxed. In the fourth session, participants were taught deep breathing techniques to get more oxygen to muscles and tissues, in different situations (eg, when making a telephone call or opening a cupboard). This focused on reducing the time it takes to get relaxed, the goal being 20 to 30 seconds.

The fifth session related to "cue-controlled" relaxation, to create a connection between the self-instruction "relax" and the state of being relaxed. This exercise focused on breathing. Just before an inhalation, the women were told to "inhale," and just before exhalation, the women were told to "relax," for a total of 5 breath cycles. The sixth session related to "differential relaxation." To relax in practically any situation, women were taught to relax the parts of the body not engaged in standing or walking movements. The final session related to "rapid relaxation," where participants practiced relaxing in a natural, no-stress situation.

METHODS

This study is a randomized controlled trial with a prospective experimental design. The independent variable was a nurse-led, 7-week applied relaxation training intervention. The major dependent variables were anxiety, perceived stress, and pregnancy outcomes, including LBW, instrumental delivery, and preterm birth. State/trait anxiety and perceived stress were measured prior to and at 7 weeks, after completion of the intervention. Pregnancy outcomes were obtained from obstetric data following pregnancy in patients solely giving birth in Iran.

A convenience sample included 110 pregnant women who were recruited from 3 prenatal clinics in Iran. Eligible subjects were primigravidae with a wanted pregnancy, aged 18 to 30, between 14 and 28 weeks' gestation (based on sonography), with uncomplicated, singleton pregnancies and no identified medical or obstetrical risk factors. Subjects were literate and fluent in the Persian language. The gestational age criterion was selected for several reasons. First, women are usually well established in their prenatal care by the second trimester. Second, adequate time would be available for practicing and performing the different stages of applied relaxation for 7 weeks, and for assessing the outcome. Third, this timing avoided the anxiety

and fears in first-time pregnant women that tend to be focused in the first and third trimesters.

Exclusion criteria were any medical or obstetric complication during the 7 weeks of intervention and elective cesarean section. Recruited participants demonstrated high levels of anxiety on the Spielberger State-Trait Anxiety Inventory (STAI). The study was conducted between October 2002 and February 2003 in prenatal clinics of 3 teaching hospitals located in central Tehran. All study procedures and ethical approval were granted by the Tarbiat Modares University Review Board. Women who consented to participate were randomly assigned to 2 groups, using a block randomization method.[42]

Data were collected by self-administered questionnaires that included state/trait anxiety. The questionnaire was administered as pretest and posttest before and after the 7-week educational intervention. A demographic and obstetric questionnaire was developed by the researchers in lay Persian to gather information about the participant's age; gestational age; lifestyle status; economic, employment, and educational situation; and obstetric history. Content and face validity of the different parts of the translated scales were assessed by a group of Iranian scholars and experts to detect any unclear, misleading, or highly sensitive questions. Following their comments, the researchers made minor revisions to the wording of the questionnaire.

The applied relaxation education was based on Ost's description of applied relaxation[39] that was provided to the experimental group, and included seven 90-minute group education sessions over 7 weeks. The technique of applied relaxation was taught by one of the researchers who is a qualified nurse and was trained individually in applied relaxation under the supervision of a clinical psychologist. For most topics of interest to pregnant women, group teaching is very effective and costs less than one-on-one teaching.[43] Classes were scheduled for times suitable to the participants. During the training in applied relaxation, women were seated in a quiet room in the prenatal clinic and were asked to imitate the different exercises demonstrated by the nurse instructor's presentations. Participants in the experimental intervention were advised to practice the applied relaxation regularly and to keep daily home relaxation practice records during the study.

To supplement the presentation and to provide a more effective program, the researchers used posters and provided participants with written material. A pamphlet included general information on anxiety and stress in pregnancy as well as information related to the different stages of Ost's applied relaxation. It was translated into simple language to ensure understanding. The control group received routine hospital-based prenatal care, which did not include applied relaxation techniques. One week following the last intervention session (during the 8th week), the experimental and control groups were asked to complete a posttest questionnaire. After birth, the control group was given the pamphlet and was informed of a group discussion about applied relaxation.

Data regarding anxiety and perceived stress were collected by a self-administered questionnaire. This was administered as pretest and posttest before and after the 7-week educational intervention. A demographic and obstetric questionnaire was developed by the researchers in lay Persian to gather information about the participant's age, gestational age; lifestyle status; economic, employment, and educational situation; and other obstetric history. The state/trait anxiety level was measured using the Persian version of the Spielberger STAI.

The STAI consists of 40 statements describing various emotional states, which has been translated into Persian, and its reliability and validity are acceptable.[44] Twenty of these statements require the subjects to describe their emotional reactions in terms of anxiety at a particular moment or period in time (state anxiety). Statements are scored on a 4-point scale of increasing intensity, from *not at all* to *very much so* (with scores of 0–3, respectively). The other 20 items require the subjects to describe how they generally feel, and their general response to situations perceived as threatening (trait anxiety). These items are also scored on a 4-point intensity scale, from *almost never* to *almost always*. For both sections, possible cumulative scores for each scale range from 0 (*not anxious*) to 60 (*high anxiety*).

Regarding validation of the English version of the Spielberger STAI in a sample of Iranian college students with and without anxiety symptoms, reliability was evaluated using the test-retest method and internal consistency was assessed using Cronbach α. Internal consistency was excellent. A high degree of internal consistency was observed for each of the 40 items, with Cronbach α's of .39 to .88, and for the total scores a Cronbach α of .86 was found. Test-retest correlation coefficients of the scores for the 40 items were highly significant. Therefore, the STAI was found to be reliable, valid, and sensitive in a sample of Iranian college students with and without anxiety symptoms.[44]

Inclusion criteria for this study required that women participating in this research had high levels of anxiety, which was operationally defined as having initial state/trait anxiety scores over 30. The perceived stress of the subjects was measured using the Perceived Stress Scale,[45] which consists of 14 Likert-type items, scored

on a 5-point scale, ranging from *never* (0) to *very often* (4). Content and face validity of the different parts of the translated scales were assessed by a group of Iranian scholars and experts to detect any unclear, misleading, or highly sensitive questions. Following their comments, the researchers made minor revisions to the wording of the questionnaire, including the Persian version of the Spielberger STAI and the Perceived Stress Scale. Because type of delivery was seen as one of the dependent variables in this study, an exclusion criterion was elective cesarean section in the subjects.

Internal consistency of the translated and revised scales was assessed. The Cronbach α's for state anxiety and trait anxiety were .70 and .78, respectively. Anxiety-related knowledge, beliefs, attitudes, and self-efficacy were also measured and analyzed, but they have been reported elsewhere.[46] Data were analyzed using descriptive and inferential statistics. Descriptive statistics were used for demographic data and to describe the sample with regard to state anxiety, trait anxiety, and pregnancy outcomes. Groups were compared using parametric and nonparametric statistics, as appropriate; some variables were not normally distributed. The level of confidence interval, for comparing the selected pregnancy outcomes between the 2 randomized groups, was considered to be 95%.

Sample size was based on a previous study[47] and on a difference of at least 10 points in the state/trait anxiety between the experimental and control groups, with $\alpha = .05$ and $\beta = 0.20$. Therefore, a sample size of 55 was estimated for each group. Power analyses were performed for preintervention trait anxiety (power = 0.51, effect size = 0.39), postintervention state anxiety (power = 0.999, effect size = 2.39), and postintervention perceived stress (power = 0.99, effect size = 2.27).

RESULTS

All subjects were married. The average age and gestational age of the participants were 23.8 years (SD = 3.1) and 17.8 weeks (SD = 1.8), respectively, at study entry. As can be seen in Table 1, there are no significant differences between the experimental and control groups regarding the mean of age and the mean of gestational age.

Of the total sample ($N = 110$), 89 women (80.9%) had a high-school diploma (had completed grades 9–12) and a college degree(s). Only 9.1% ($n = 10$) of the participants were employed. The majority of the women were in lower than moderate socioeconomic status ($n = 78$). The intervention and control groups did not differ significantly (Table 1). Of the total sample, 6 women (5.5%) declined to participate in the posttest: 3 from the experimental group (2 participants refused to take part in the training because they were moving to another city and 1 developed a urinary tract infection) and 3 from the control group (1 did not keep the posttest appointment, 1 declined to participate further in the study because of the decision to have an elective cesarean section, and 1 became hypertensive).

Table 1. Demographic characteristics of the participants at preintervention

Demographic variables	Experimental ($n = 55$)	Control ($n = 55$)
Age, y*	23.95 (2.98)	23.60 (3.28)†
Gestational age, wk*	17.67 (2.10)	17.93 (2.05)†
Education‡		
Elementary	11 (10)	10 (0.1)†
High school	35 (31.8)	34 (30.9)†
Higher than diploma	9 (8.2)	11 (10)†
Employment status‡		
Employed	7 (6.4)	3 (2.7)†
Unemployed	48 (43.61)	52 (47.3)†
Economic status‡		
Lower than moderate	38 (34.5)	40 (36.4)†
Higher than moderate	17 (15.5)	15 (13.6)†

*Given as mean (SD) except where indicated otherwise.
†Not statistically significant.
‡Given as frequency, with values in parentheses indicating percentages, except where indicated otherwise.

No differences in the demographic variables (ie, age, gestational age, education, economic status, and employment) or in the dependent variables (ie, state anxiety, trait anxiety, and perceived stress) were found between these individuals and those who remained in the study. There were no significant differences in state/trait anxiety ($P = .332$, $P = .052$), and perceived stress ($P = .800$), between the groups before intervention. At postintervention, scores for state/trait anxiety and perceived stress showed significant decreases in the experimental group when compared to the control group ($P < .001$), which is reported elsewhere. Data related to pregnancy outcomes were gathered from obstetric/medical records of the women. In this study, both gestational age and birth weight were considered as pregnancy outcomes. The mean and standard deviation of these dependent variables were 38.41 weeks (SD = 3.43) and 3025.48 g (SD = 557.25), respectively.

As shown in Table 2, the difference of the mean of birth weight was significant in the experimental group compared to the control group ($P = 0.009$), whereas the difference between the average gestational age was

Table 2. Comparison of pregnancy outcomes between 2 groups

Variables	Experimental group ($n = 52$)	Control group ($n = 52$)	*P*
Birth weight average, g*	3168 (420)	2883 (640)	.009
Low birth weight†	3 (5.8)	14 (26.9)	.003
Gestational age at birth, wk*	38 (5.89)	38 (4.377)	.689‡
Preterm birth†	1 (1.9)	5 (9.8)	.102‡
Abnormal type of delivery†	11 (21.2)	25 (48.1)	.002
Type of delivery†			
Normal vaginal delivery	41 (78.8)	27 (39.7)	.001
Cesarean section	8 (15.4)	21 (40.4)	.001
Instrumental delivery	3 (5.8)	4 (7.7)	.001

*Given as mean (SD) except where indicated otherwise.
†Given as frequency, with values in parentheses indicating percentage, except where indicated otherwise.
‡Not statistically significant.

not statistically significant ($P = .689$). The rates of LBW (<2500 g) in the experimental and control groups were 5.8% and 26.9%, respectively.

With respect to the rate of preterm birth (gestational age <37 weeks), the rates in the experimental and control group were 1.9% and 9.8%, respectively, which was not statistically significant. The third variable that measured pregnancy outcome in the study was the rate of instrumental delivery, including forceps and vacuum and surgical deliveries. The overall rate of normal vaginal delivery was 65.4% ($n = 68$) and abnormal delivery (instrumental deliveries and/or cesarean section) was 34.6% ($n = 36$). The number of all instrumental and surgical deliveries in the experimental and control groups was 11 (21.2%) and 25 (48.1%), respectively, and there was a significant difference ($P = .002$). Results of the first part of this prospective randomized controlled study demonstrated that the educational intervention during pregnancy significantly reduces the level of anxiety and perceived stress in the experimental group.[14]

DISCUSSION

Most women in this study were highly educated and motivated to learn the technique of the applied relaxation to reduce the probable adverse pregnancy outcomes. Therefore, results cannot be extrapolated for less educated pregnant women. The study participants were also married and most were unemployed (Table 1); therefore, results may differ for unmarried women or those of different occupational backgrounds. Nonetheless, this study demonstrated that teaching applied relaxation technique to anxious primigravid women could reduce the rates of LBW and cesarean section.

As shown in Table 2, there was a significant difference in the mean score for birth weight between the intervention and control groups ($P = .009$). The rate of LBW in the total sample was 16.3% ($n = 17$), which differs from a recent study in Iran that found a rate of 9%.[48] But when this variable in the 2 randomized groups was analyzed, there was a significant difference ($P = .003$) between the experimental group (5.8%) and the control group (26.9%). Interestingly, the rate of LBW in the experimental group was much lower than that in the control group and than the average rate of LBW in both developing and developed countries.[49]

Since lowering the rate of premature births is one of the main aims of prenatal care,[26] the second variable (gestational age) was assessed in this study. No significant difference ($P = .689$) was found between the randomized groups with respect to gestational age. Although the analysis showed that the rate of preterm birth in the experimental group was 1.9% and in the control group was 9.8%, the difference was not statistically significant ($P = .102$). This finding differs from reports of the rate of preterm births in some selected central areas of Tehran, which estimated the average rate of preterm birth to be 12.1%.[50]

Also, the rate of preterm birth in the experimental group was much lower than the 2 Western studies that reported rates of preterm labor of 9.6%[27] and 10%[28] that lead mostly to preterm birth. However, a possible explanation of the surprisingly low rate of preterm births in the experimental group is that all subjects in the study were selected from obstetrically low-risk pregnant women, whereas in the mentioned Iranian study[50] subjects included both women with low- and with high-risk pregnancies. A second possible explanation can be a limited understanding of the etiology of preterm birth, although there is growing evidence that infection, neuroendocrine processes, and

genetic factors are involved in the etiology of preterm birth.[51]

With respect to the type of delivery variable in this study, of the total subjects, the majority of the experimental group ($n = 41$; 78.8%) had normal vaginal delivery, whereas the majority of the control group ($n = 21$; 40.4%) had cesarean section. Although women with elective cesarean section were excluded in this study, the rate of cesarean section in the control group was even higher than that of the United States, which recorded the highest rate of cesarean section (26.1%) among Western countries in 2002[52]; the rate of cesarean section in a recent study in Isfahan (one of the major cities in Iran) was estimated to be 36.2%.[53] Possibly, the high incidence of cesarean section in the control group is related to the setting of the study.

Because the study was performed at teaching hospitals, where usually minor complications, with the request of women during labor pain, leads to surgical delivery, that may explain the high incidence of cesarean section in the control group. According to the literature, nonvaginal delivery, including instrumental extraction[34,35] and cesarean section,[36] are associated with a greater incidence of complications, such as fetal injury. Therefore, apart from the economic burden of cesarean section in every society, establishing some new strict protocols may be necessary for reducing the rate of unnecessary cesarean section in Iran. Nevertheless, the experimental group that received relaxation training had significantly lower instrumental delivery (21.2%), including cesarean section, compared with the control group (48.1%).

In general, results of the present study are consistent with previous research[6,8,9] that concluded reducing anxiety and stress (with relaxation techniques) during pregnancy could help improve birth outcomes. In this study, the findings have implications for pregnant women to control anxiety and stress to promote normal birth weight and normal delivery. However, since there is very limited research regarding the effect of the applied relaxation technique on reducing anxiety and pregnancy outcomes, this study does provide some directions for future research in diverse groups of pregnant women, including those with high-risk pregnancy. Therefore, it is recommended that further research continue to explore (1) the effect of the relaxation techniques on mother-infant attachment and successful breast-feeding; (2) cost-benefit of relaxation education to pregnant women; and (3) the effect of the other methods of relaxation techniques on pregnancy outcomes among anxious women.

It seems that learning relaxation skills from a perinatal nurse, who plays an important role in women's psychological adaptation to pregnancy,[54] could stimulate women to become more focused on their health in general, which could lead to successful childbearing and child rearing. The findings in terms of the positive effects of relaxation training on birth weight and normal vaginal delivery are encouraging; however, some limitations of the study should be acknowledged.

Limitations of the study

Because of the homogeneity of the 2 groups, no confounding variables were found. The majority of the women were housewives, well educated, and with a wanted pregnancy. Thus, they were more likely to participate in the educational program and practice different stages of the applied relaxation techniques at home than women who are employed, undereducated, or with an unwanted pregnancy.

Some studies[55,56] have found that group education appears to provide psychosocial benefits, increase individuals' confidence, and provide a supportive and familiar atmosphere. In this study, group training might have influenced results in the experimental group (apart from the performance of applied relaxation). Women might have learned something during the group sessions, other than relaxation techniques, that reduced their anxiety and perceived stress. Women might have socialized after the education sessions, either in person or over the telephone. These interactions could have provided social support that reduced their anxiety and stress and improved the selected pregnancy outcomes.

In this study, the frequency of home practice of applied relaxation was based on unverified, subjective self-reports from each participant in the experimental group. However, the subjects experienced a wanted pregnancy, which could have motivated them to use the relaxation techniques at home to ensure a healthy pregnancy outcome. This notion is supported by the results of another study in which pregnant women attributed a high level of importance to rest and relaxation compared with that to other lifestyle activities, such as physical exercise.[57] Women participating in this study were only low-risk pregnant women who met the study eligibility criteria. Generalization of the present results to a more diverse group of women, including high-risk pregnant women, is therefore not appropriate.

CONCLUSION

It is concluded that to equip maternity nurses and midwives with basic knowledge and adequate training

in relaxation techniques as a resource for improving maternal psychological health, which can result in improved pregnancy outcomes, is important. The findings of this study indicated that anxious pregnant women who received the applied relaxation training, experienced improved maternal psychological health, which resulted in significantly fewer cases of LBW and cesarean section, in comparison with the control group. It is concluded that this intervention is effective and should be offered to all primigravid anxious women to reduce anxiety and adverse pregnancy outcomes.

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